

User Manual for Web_based Agilent 54624A Oscilloscope
(Preliminary version)

by Yuke Tian (x2872)
Email: ytian@bnl.gov
Date: 9/30/02

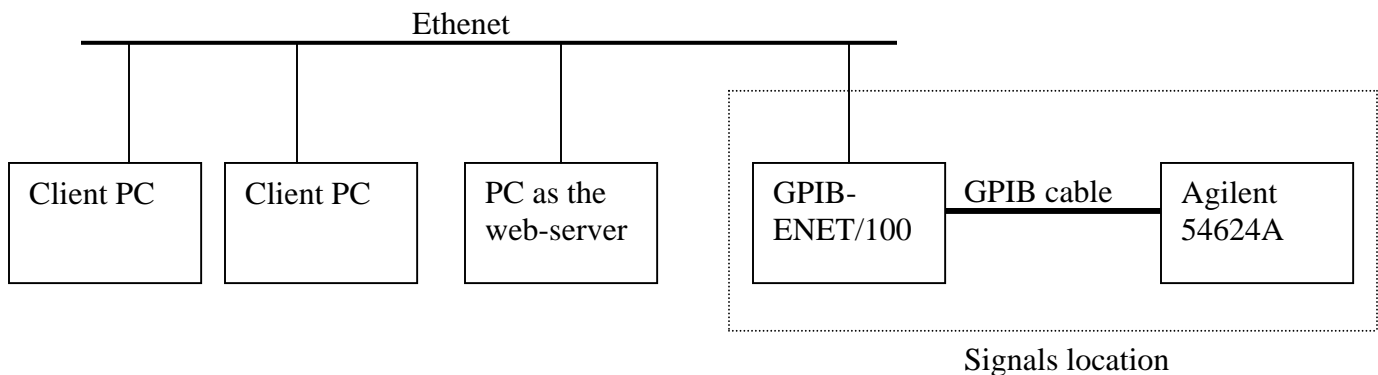
1. Design goal

The purpose of this design is to enable user to monitor/control the Agilent 54624A oscilloscope using web browser from a remote location.

2. Architecture

1) Drivers and instrument

National Instrument provides an instrument driver for the Agilent oscilloscope and a GPIB-Ethernet converter equipment (GPIB-ENET/100). These enable us to construct the following architecture for our system:



In the above picture, one PC is used as a web-server. The Labview running engine, driver for GPIB-ENET/100 and driver for Agilent 54624A are installed on this web-server. All other client PCs only need a Labview running engine to access and control the oscilloscope using web browser (Internet Explorer or Netscape). All the above drivers can be free download. However, only one client PC can access/control at a time since a remote control panel license is required for each server-client pair. The server can always regain the control at any time.

2) System performance analysis

This system is not a real-time data collection system due to the following two major bandwidth bottlenecks.

a. The oscilloscope driver collect maximum 2000 point for each channel's waveform. This process takes about 160ms. If we need to collect all the four channels' waveforms, the total delay is long and can be noticeable.

b. The bandwidth for the GPIB-ENET/100 is 900K byte/second. As each waveform consists of 2000 points and each point is an eight-byte (double floating data) data, the total data for a waveform is about 16K bytes and it takes the GPIB-ENET/100 about 18ms to transfer a waveform.

c. The delay from the Ethernet. If we access the Ethernet through an Ethernet card (NIC card), the bandwidth can be 10Mbit/second or 100Mbit/second and the delay caused by the Ethernet traffic can be neglected. If we use a 56K modem to dial up Ethernet, the delay will be large (more than 200ms delay for each waveform).

Adding these factors together and assuming the client PC is connected to the Ethernet through an Ethernet card, the waveform update speed is about 0.2ms for one channel's waveform.

3) LabView programming

A Labview program was developed to implement most oscilloscope functions and keep the user interface similar to the scope for operation convenience. These functions are:

- a. Horizontal control: including sweep speed control, delay time control.
- b. Vertical: including four channel's on/off control, scale control, and offset control.
- c. Run/control: including run/stop control, single/continuous running control.
- d. Measurement: including X-Y cursors measurement and quick measure.
- e. Waveform acquire: including normal acquire and average acquire.
- f. Trigger setup: including edge trigger setup, pulse width trigger setup and pattern trigger setup. If a trigger condition is not satisfied, the driver will wait for the trigger event at least 10 seconds and then allow user to change the trigger settings or the user can continue to wait for the trigger event.
- g. Autoscale.

3. Operation

- 1) A client PC must have Labview running engine installed to control the oscilloscope.
- 2) The web server address depended on location of the web-server machine. At this development stage, the machine (<http://130.199.105.1/ag54624a.htm>) is used temporarily for the web-server.
- 3) Access control is obtained by the right click of the mouse. It takes seconds for the web-server to release control to the client machine.
- 4) After the client PC finished its work, use Control+F3 to exit from program. There will be three choices. It is recommended to use the second option (put the program in stop mode and then release the access control) when client want to exit. The reason is that if we leave the program in running/updating waveform state, the server will spend most of its time in data collection/calculation and don't respond to the client request in a timely manner. It is difficult for the next client to gain control from the server.
- 5) Client should release the control before exit from the browser.